



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

70001

7590

08/13/2009

NIXON PEABODY, LLP
300 S. Riverside Plaza
16th Floor
CHICAGO, IL 60606

EXAMINER

CRAIG, DWIN M.

ART UNIT

PAPER NUMBER

2123

DATE MAILED: 08/13/2009

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/675,778 | 09/29/2000 | Lars Langemyr | 801939-000101 | 8229 |

TITLE OF INVENTION: METHOD AND APPARATUS FOR THE SPECIFICATION AND AUTOMATIC DERIVATION OF PARTIAL DIFFERENTIAL EQUATIONS ASSOCIATED WITH COUPLED PHYSICAL QUANTITIES IN A MULTIPHYSICS PROBLEM

| APPLN. TYPE | SMALL ENTITY | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|----------------|--------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional | NO | \$1510 | \$0 | \$0 | \$1510 | 11/13/2009 |

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail

**Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

70001 7590 08/13/2009

**NIXON PEABODY, LLP
300 S. Riverside Plaza
16th Floor
CHICAGO, IL 60606**

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE-FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| |
|--------------------|
| (Depositor's name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/675,778 | 09/29/2000 | Lars Langemyr | 801939-000101 | 8229 |

TITLE OF INVENTION: METHOD AND APPARATUS FOR THE SPECIFICATION AND AUTOMATIC DERIVATION OF PARTIAL DIFFERENTIAL EQUATIONS ASSOCIATED WITH COUPLED PHYSICAL QUANTITIES IN A MULTIPHYSICS PROBLEM

| APPLN. TYPE | SMALL ENTITY | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|----------------|--------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional | NO | \$1510 | \$0 | \$0 | \$1510 | 11/13/2009 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---------------|----------|----------------|
| CRAIG, DWIN M | 2123 | 703-002000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

2. For printing on the patent front page, list

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/147; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2
_____ 3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P O Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

09/675,778

09/29/2000

Lars Langemyr

801939-000101

8229

70001

7590

08/13/2009

NIXON PEABODY, LLP
300 S. Riverside Plaza
16th Floor
CHICAGO, IL 60606

EXAMINER

CRAIG, DWIN M

ART UNIT

PAPER NUMBER

2123

DATE MAILED: 08/13/2009

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 578 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 578 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability**Application No.**

09/675,778

Examiner

DWIN M. CRAIG

Applicant(s)

LANGEMYR ET AL.

Art Unit

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 7/27/2009.
2. ☒ The allowed claim(s) is/are 1, 3-71, 75-83, 85-87, 89-93 and 95-122.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

And

EXAMINER'S REASONS FOR ALLOWANCE

1. Claims 1, 3-71, 75-83, 85-87, 89-93 and 95-122 are allowed.

Comments

2. The Examiner thanks the Applicants' for sending in a Terminal Disclaimer to case serial number 10/042,936 which is about to issue as a patent.

Examiner's Reasons for Allowance

3. The following is an examiner's statement of reasons for allowance:

While *Watts* teaches modeling a physical system using a partial differential equation and *Sagawa* teaches outputting to a display device a model of a physical system based on a set of partial differential equations, **none of these reference(s) taken either alone or in combination with the prior art of record disclose**, representing at least one of a plurality of physical systems as two or more selected application modes, as specifically argued in the interview summary dated 7/24/2009 in which the Applicants' attorney persuasively argued that the claimed physical system model with two or more selected applications modes effectively teaches a multiphysics model as disclosed in pages 14-16 of Applicants' instant specification, specifically including:

(claim 1) "representing at least one of a plurality of physical systems as two or more selected application modes modeling physical quantities of said at least one of said plurality of physical systems, wherein said application modes are configured to model the physical quantities for at least one of structural mechanics properties, fluid dynamic properties, electromagnetic

properties, chemical reaction properties, acoustic properties, and heat transfer properties of said physical system;”

(claim 42) “a computer comprising a processor, a user input device, a display device, and a memory device, said memory device containing executable instructions for producing said model of said combined physical system having physical quantities by representing physical quantities of said combined physical system in terms of said combined set of partial differential equations, said executable instructions causing said processor to perform, upon execution, acts comprising representing in up to three space dimensions at least one of a plurality of systems as two or more selected application modes modeling physical quantities of said one of said plurality of systems;”

(claim 82) “defining a plurality of user-defined application modes modeling physical quantities of an associated model having up to three space dimensions, wherein the application modes are configured to model the physical quantities of at least one of a structural system, a fluids system, and an electromagnetic system; selecting two or more of the user-defined application modes;”

(claim 92) “a computer system comprising a processor, a user input device, a display device, and a memory device, said memory device containing executable instructions for producing said model of said combined physical system having physical quantities by representing physical quantities of said combined physical system in terms of solving a system of partial differential equations, said executable instructions causing said processor to perform, upon execution, acts comprising defining a plurality of user-defined application modes modeling

physical quantities of an associated model; selecting two or more of said user-defined application modes;”,

(claim 116) “representing in up to three space dimensions at least one of a plurality of systems as two or more selected application modes modeling physical quantities of said at least one of said plurality of systems, wherein said systems include a structural system, a fluids system, an electromagnetic system, or any combination thereof;”,

(claim 117) “representing at least one of a plurality of systems as two or more selected application modes modeling physical quantities of said at least one of said plurality of systems, wherein said systems comprise at least one of a structural system, a fluids system, and an electromagnetic system; using a first physical computing device to determine a set of partial differential equations for each of said two or more selected application modes, parameters of said partial differential equations being physical quantities of corresponding ones of said plurality of systems;”,

(claim 118) “representing said combined physical system by a geometry described by a mesh and a set of physical properties, said mesh including a plurality of elements, each of said elements being characterized by a shape; providing a plurality of application modes; selecting at least a first and a second of said application modes; using a first physical computing device to generate a first plurality of partial differential equations based on said first application mode and a second plurality of partial differential equations based on said second application mode, each of the partial differential equations representing a behavior of at least one of said physical quantities of said model in response to said set of physical properties; using said first physical computing device or a second physical computing device and the first and second

pluralities of partial differential equations to form a combined system of partial differential equations;”,

(claim 121) “representing the combined fluids system by a geometry described by a mesh and a set of physical properties, the mesh including a plurality of elements, each of the elements being characterized by a shape; providing a plurality of application modes; selecting at least a first and a second of the application modes; generating a first plurality of partial differential equations based on the first application mode and a second plurality of partial differential equations based on the second application mode, each of the partial differential equations representing a behavior of at least one of the physical quantities of the model in response to the set of physical properties; forming a combined system of partial differential equations based on the first and second pluralities of partial differential equations; generating a solution based on the combined system of partial differential equations, the solution comprising numerical values for the physical quantities of node points in the mesh;”,

(claim 122) “representing the combined system by a geometry described by a mesh and a set of physical properties, the mesh including a plurality of elements, each of the elements being characterized by a shape; providing a plurality of application modes; selecting at least a first and a second of the application modes; using the first processor or the second processor to generate a first plurality of partial differential equations based on the first application mode and a second plurality of partial differential equations based on the second application mode, each of the partial differential equations representing a behavior of at least one of the physical quantities of the model in response to the set of physical properties; forming a combined system of partial differential equations based on the first and second pluralities of partial differential equations;

generating a solution based on the combined system of partial differential equations, the solution comprising numerical values for the physical quantities of node points in the mesh;”, **in combination with the remaining elements and features of the claimed invention.** It is for these reasons that Applicants’ invention defines over the prior art of record.

3.1 Dependent claims 3-41, 43-71, 75-81, 83, 85-87, 89-91, 93, 95-115, 119 and 120 are allowed for at least the reason that they depend upon an allowed base claim.

3.2 Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DWIN M. CRAIG whose telephone number is (571)272-3710. The examiner can normally be reached on 10:00 - 6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Paul L. Rodriguez can be reached on (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR

Art Unit: 2123

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dwin M Craig/

Examiner, Art Unit 2123

/David R Vincent/

Supervisory Patent Examiner, Art Unit 2129